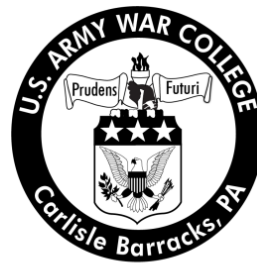


# Strategy Research Project

## Aligning Infrastructure Decisions with Strategic Vision

by

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United States Army War College  
Class of 2012

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# USAWC STRATEGY RESEARCH PROJECT

## **ALIGNING INFRASTRUCTURE DECISIONS WITH STRATEGIC VISION**

by

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## **ABSTRACT**

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Infrastructure, in terms of land and real property, is a large component of the Department of Defense budget. Enormous resources are spent each year to acquire land, build, maintain, renovate and replace infrastructure for this global enterprise. The current DoD real estate portfolio, including land and real property, is approximately \$710 billion. The lead time for new infrastructure is five to twenty years, well beyond the event timeline for normal operational decisions. In addition, strategic guidance will likely change during this timeframe, potentially invalidating current infrastructure decisions. Given the likelihood of strategic guidance changing more rapidly than infrastructure decision timelines, how does the Army ensure its infrastructure portfolio is consistently aligned with its strategic goals? In addition to operational efficiency, the Army seeks to provide the nation the highest quality defense posture at the lowest possible cost. Furthermore, the Army must compete with the job market to procure talented individuals in an all-volunteer force and, thus, must balance essential infrastructure with desirable amenities. Considerations such as land ownership arrangements, cultural identity, conceptualizing, and planning/design ideas, could potentially influence Army infrastructure and assist in its alignment with strategic vision.





## ALIGNING INFRASTRUCTURE DECISIONS WITH STRATEGIC VISION

If we could first know where we are and whither we are tending, we could better judge what to do and how to do it.<sup>1</sup>

—Abraham Lincoln

The Department of Defense (DoD) faces numerous challenges in the future. One of the most daunting involves continuing to provide the level of global security to which the American public has become accustomed since World War II in anticipation of steeply declining budgets. Not only is the United States domestic economic situation struggling to recover, but global financial markets are facing severe challenges causing global domestic product (GDP) to shrink in many countries.<sup>2</sup> This, in turn, is leading to likely curtailment of military budgets for those countries, which makes their ability to mitigate any security risks created by changing U.S. defense posture even more challenging. Army leadership must ensure decisions are tied to strategic vision to avoid unnecessary expenditures and effectively manage declining financial resources.

The infrastructure portfolio is one area of the defense enterprise which bears scrutiny as infrastructure management decisions have the potential of large fiscal impacts throughout the Army. The lead time for new infrastructure is roughly five to twenty years, given planning, programming, property acquisition, and environmental considerations, which is typically beyond the event timeline for operational decisions. In addition, U.S. strategic guidance will likely change during this timeframe, potentially invalidating contemporary infrastructure decisions. It is important, therefore, that leaders in installation management have a variety of methods available to adjust infrastructure processes to maintain close alignment with DoD strategic vision. Accordingly, the Army should examine and develop flexible strategies to ensure its infrastructure portfolio

remains aligned with DoD strategic goals to provide a robust defense posture while preserving resources for core competencies.

Infrastructure refers to the basic facilities, services, and installations needed for the functioning of a community, society, organization or system.<sup>3</sup> Financial decisions within DoD are heavily influenced by strategic infrastructure decisions. With over 28 million acres and 542,000 buildings and structures,<sup>4</sup> DoD spends a significant portion of its budget to maintain its global infrastructure. As of 2008, the DoD real estate portfolio, including land and real property, was estimated at \$710 billion to which the DoD allocated approximately \$55 billion annually, or approximately 8% of the plant replacement value, to ensure its infrastructure remained current and capable of supporting national interests.<sup>5</sup> This annual infrastructure investments equates to 11.4% of the 2008 DoD base budget of \$481.4 billion.<sup>6</sup>

Senior leaders deal in options and the determination of trade space to develop effective strategy. The classic Clausewitzian framework of Ends, Ways, and Means is a triad used by leaders to achieve desired goals.<sup>7</sup> Within the DoD, the Ends (objective) roughly remain the same (e.g. security of the homeland) even as strategy, adversaries, and the operational environment fluctuate. What typically changes within the triad is the Means (resources), as Congress adjusts the defense budget on an annual basis. Therefore, the challenge for senior defense leaders is to effectively adjust the Ways (methods) to provide effective security for the United States. The first step in the process is to ensure a direct and timely link between strategic vision for the Army and installation management strategic guidance. Secondly, tools are required for senior leaders to either facilitate timely changes within infrastructure decision processes to

rapidly reset the infrastructure footprint as strategy fluctuates, or improve qualitative decisions which will compensate for strategic vision vacillations.

### Strategic Vision

Several documents set the strategic vision for the Army and the Army installation community. The National Security Strategy, the National Defense Strategy, and the National Military Strategy establish broad, national concepts from the President, through the Secretary of Defense and the Chairman of the Joint Chiefs of Staff to the Army Chief of Staff. The Army Strategic Planning Guidance is then promulgated by the Secretary of the Army and the Army Chief of Staff to help direct Army leaders to fulfill Title 10 obligations to organize, train, and equip the force.

Significant intellectual energy has shaped the Army's strategic picture the last ten years and produced several documents such as: Global Defense Posture Review (GDPR), Overseas Basing Commission Report, Base Realignment and Closure (BRAC) Commission Report, Quadrennial Defense Review, Army Campaign Plan, Army Transformation Roadmap, Army Modernization Plan, Army Modular Force Plan (AMFP), Army Force Generation Model (ARFORGEN), National Strategy for Homeland Security, and Strategy for Homeland Defense and Civil Support.<sup>8</sup> Concepts therein have had a dramatic short term impact on Army installations. As a result of GDPR, BRAC, and AMFP, the Army moved approximately 150,000 military and civilian billets onto domestic installations from other U.S. installations, overseas bases, and leased space.<sup>9</sup>

The relevant section from the Army Strategic Planning Guidance (APG) 2011 for facilities in the mid-term (2013-2019) provides general insight into how the Secretary of the Army and Army Chief of Staff view infrastructure resourcing. The focus on Quality of Life (QOL) for soldiers and family members indicates investment in health care, youth

services, family housing, sustainment of existing community programs, worldwide protection for personnel and infrastructure, environmental compliance and conservation, and energy security and sustainability initiatives.<sup>10</sup> In addition, capital investments in military construction (MILCON) will support the expeditionary Army and communities of the future, while Sustainment will be funded at 90% of the OSD sustainment model and controlled by prohibiting migration of sustainment funds to Restoration and Modernization.<sup>11</sup> While the APG lists 2013-2019 as mid-term objectives, these are short-term objectives in infrastructure terms as budget estimates and real property decisions are already underway for these years, and adjusting construction decisions within this timeframe can be problematic.

#### Linking Infrastructure to Strategic Vision

The current strategic alignment for Army infrastructure is derived from the 2007 Defense Installations Strategic Plan (DISP), developed by the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD AT&L).<sup>12</sup> The USD AT&L lists seven goals broad goals, two of which are linked directly to infrastructure: “Capable, efficient, and cost effective installations,” and “High performing, agile, and ethical workforce.”<sup>13</sup> The DISP translates these two goals into six strategic initiatives which are:

- Right Size and Place: Locate, size, and configure defense installation assets to meet the required capabilities of military forces.
- Right Quality: Assess and deliver installation capabilities needed to provide effective, safe, and environmentally sound living and working places in support of DoD missions.

- Right Risk: Protect personal, property, and mission capabilities through informed risk decisions at the appropriate level of leadership.
- Right Resources: Balance resources and risks to provide high quality installation capabilities, and to optimize life-cycle investment to support readiness.
- Right Management Practices: Continuously improve installation planning and operations by embracing best business practices and modern asset management techniques.
- Right Workforce: Develop a high performing, agile, and competent workforce.

The DoD infrastructure vision statement is framed as “Installation assets and services are available when and where needed, with the joint capabilities and capacities necessary to effectively and efficiently support DoD missions.”<sup>14</sup>

The Army Installation Strategic Plan captures these concepts in three strategic themes linked directly to higher strategic documents and four themes indirectly. Directly linked themes include joint operations and coordination, higher quality of facilities and services, and increased antiterrorism/force protection efforts with accessibility. The indirect linkages include sustainability and natural resource management, managing assets on a limited budget, adherence to common DoD standards and metrics, and greater collaboration with communities surrounding military bases.<sup>15</sup>

#### Changing from Decentralized to Centralized Management

The general framework for strategic guidance of Army installations is derived from the documents listed above which are created at the highest levels of the federal government. Translating these documents into policy and strategic implementation rests

with the Assistant Secretary of the Army (ASA) for Installations, Environment & Energy (I,E&E) and the Assistant Chief of Staff Installation Management (ACSIM). In order to execute strategic guidance the Lieutenant General in charge of OACSIM also functions as commander of Installations Management Commander (IMCOM).<sup>16</sup>

Senior Service Fellow COL Joseph Moore in, “The Installation Funding Dilemma,” succinctly described the major change the Army made within the last nine years to an enterprise management system for installations which resulted in the formation of IMA in 2003, and eventually IMCOM in 2007. Wide variations in levels of quality within installations prompted Army Chief of Staff Dennis Reimer to begin Transformation of Installation Management (TIM) in 2001.<sup>17</sup> Previously, senior mission commanders (SMCs) provided command and control of garrisons with funding through their associated Major Commands (MACOMs). This decentralized system presented a number of issues. One issue was the obscuration of the true cost of base operations support (BOS) as local commanders would often migrate funds from other operational accounts to cover BOS shortfalls.<sup>18</sup>

TIM resulted in a centralized system managed by the Installation Management Agency (IMA) which was initiated in FY2003. IMA created a new management structure for the Army’s global real property portfolio and had the mission to “provide equitable, effective and efficient management of Army installations worldwide to support mission readiness and execution, enable the well being of Soldiers, civilians and family members, improve infrastructure, and preserve the environment.”<sup>19</sup> IMA continued to refine its processes and was redesignated Installation Management Command in FY2007. IMCOM also absorbed Family and Morale, Welfare and Recreation (FMWR)

Command and the Army Environmental Command (AEC). This new, centralized structure ensured funding came directly from the Pentagon, according to Secretary of the Army Thomas White, while removing the burden of installation management by the MACOMs.<sup>20</sup>

The Army met the challenge to realign its global infrastructure management system while engaged in two conflicts (OPERATION IRAQI FREEDOM and OPERATION ENDURING FREEDOM), and facing significant force structure changes in the form of GDPR, Army Modular Force, and the ARFORGEN process. These concurrent demands forced a holistic overhaul of the existing system. If each of these issues had been addressed individually, the tendency would have been to incrementally burden the current system to accommodate each set of conditions, instead of recognizing the need to overcome bureaucratic inertia and entirely redefine the system and supporting processes. The switch to a centralized infrastructure command and control structure should ultimately result in greater unity of effort for infrastructure decisions and is a critical step in expediting infrastructure alignment with changes in strategic vision.

#### Current Tools to Align Infrastructure

Unity of effort within the military system does not necessarily translate to effective changes due to the numerous political factors affecting the global infrastructure footprint. An essential tool used by DoD to affect infrastructure has been the BRAC process. The BRAC process established working groups to review the majority of DoD infrastructure and derive new combinations to ensure the infrastructure footprint meets the strategic intent of the DoD. Four previous rounds of BRAC occurred in 1988, 1991, 1993, and 1995 to reduce the DoD Cold War military footprint.<sup>21</sup>

The political battles of previous BRAC rounds left many skeptical of its efficacy. The Base Realignment Act of 1990 was amended through the 2005 Appropriations Act to reduce political obstacles that come from closing bases in various congressional districts.<sup>22</sup> The amendment required Congress to provide an ‘all or nothing’ vote on the final list of recommendations from the BRAC Commission, via the President, to keep powerful Congressmen from dismantling the closure list.<sup>23</sup>

The other significant change with BRAC 2005 was the reduced emphasis on base closure and the increased effort toward realignment of assets. The four previous rounds of BRAC, eliminated approximately 21% of excess defense infrastructure.<sup>24</sup> Originally, the 2005 BRAC round was expected to exceed this mark and reach a 25% reduction in infrastructure.<sup>25</sup> However, in May 2005, Secretary of Defense Donald Rumsfeld announced that instead of a 20 to 25% reduction, BRAC 2005 recommendations would only cut between 5 to 10% of infrastructure to support soldiers returning to domestic bases as part of the GDPR and the reduction of leased space in the DoD portfolio.<sup>26</sup>

BRAC 2005 demonstrated failures in cost controls, as the implementation costs were approximately \$35B according to a GAO FY10 estimate, nearly 67% higher than the original 2005 estimate by the Army of \$21B.<sup>27</sup> Actual annual savings have continued to decrease during the implementation period, 2006-2011, and the DoD estimate for savings starting in FY12 is approximately \$3.9B.<sup>28</sup> In addition, the GAO concluded this estimate of recurring annual savings “may be overstated because they [DoD] included dollar savings from eliminating military personnel positions without corresponding decreases in end-strength,” and that the “DoD does not regularly review savings



estimates to ensure that the estimates continue to represent the most likely outcomes for anticipated savings.”<sup>29</sup> In summary, BRAC 2005 focused on transformation of force structure to support modularity, consolidation of training centers and schools, relocation of major command headquarters, and maintenance of joint warfighting capability. This necessarily entailed movement of personnel and force structure from overseas to domestic locations, and movement of support activities away from Washington D.C.<sup>30</sup>

BRAC	Major Base Closures <sup>a</sup>	One-time costs (\$B)	Annual savings (\$B)
1988	16	2.7	0.8
1991	26	5.2	1.9
1993	28	7.5	2.3
1995 <sup>31</sup>	27	6.5	1.6
2005 <sup>32</sup>	21 (27 realignments)	34.9 (FY10 est)	3.9(FY10 est)

Table 1. BRAC closures, costs, and estimated savings

Note: Major base closure or realignment refers to actions with Plant Replacement Value > \$100M

The working groups for the 2005 BRAC were tasked with evaluating DoD infrastructure greater than \$10M in value **or** larger than 5 acres (domestic) and greater than \$10M in value **and** larger than 5 acres (foreign). The basic tenets considered for the military included: Recruit and Train; Quality of Life; Organize; Equip; Supply, Service, and Maintain; Operationally Deploy and Employ; and Intelligence.<sup>33</sup> The groups were provided a set of final selection criteria which included four primary principles of ‘military value’, and four ‘other considerations’ of secondary importance. The eight criteria can loosely be categorized as Mission (readiness, surge), Costs (operations,

manpower, length of payback on closure), and Infrastructure (quality, quantity, environmental).

These broad categories represent the concepts presented in the DISP. Three of the six initiatives, Right Size and Place, Right Resources and Right Quality, relate directly to these BRAC criteria. Thus, BRAC 2005 criteria was synchronized with the DoD's strategic vision, although cost overruns call into question the tenet of Right Management Practices. The breakeven point to taxpayers for BRAC 2005 continues to be elusive as cost overruns increase and actual annual savings decrease. Currently, 2018 is the projected financial breakeven point for BRAC 2005, although there is no requirement to track annual recurring cost savings, so this data point will not be determined with definition.<sup>34</sup>

A more efficient defense structure will have inherent value to the nation if BRAC 2005 results in a defense network which is more capable, more versatile, and more efficient. BRAC provides a broad, comprehensive assessment of DoD infrastructure on a periodic basis. Post closures or realignments can have significant repercussions to local communities, so defining a process which is aligned with strategic vision, equitable, and capable of overcoming political and legal challenges, is a difficult proposition. Defense Secretary Leon Panetta was recounted in a Pentagon news conference as saying, "I've been through BRAC. I know its weaknesses and its failings. Obviously, we will continue to work to make sure it is done effectively and that we achieve the savings that we hope to achieve through the process. But I have to tell you there is no more effective process to make it happen than using the BRAC process."<sup>35</sup>

## Potential Tools for Aligning Infrastructure

New defense strategy is emerging in 2012 which could significantly impact the current infrastructure portfolio.<sup>36</sup> Reduction in full-service overseas bases, increased focus on expeditionary forces, and the requirement to overcome anti-access/anti-denial systems are being discussed as strategic elements which may impact the installation community. These emerging changes highlight the difficulty of trying to quickly reset infrastructure. For example, BRAC is being discussed as the tool to make infrastructure changes to the current strategic guidance with proposed BRAC rounds in 2013 and 2015.<sup>37</sup> Although realignments may occasionally be executed more quickly than new construction, this is not always the case, as gaining installations seldom have surplus square footage with suitable tenant improvements. More likely, the full execution would take approximately five years to implement based on the BRAC 2005 model. The DoD, therefore, would not expect to see 2012 strategic changes fully implemented from an infrastructure perspective until approximately 2020. This lag time shows the difficulty in adjusting infrastructure to strategic vision in a timely manner.

Improving BRAC execution processes is one method for faster alignment between strategy and infrastructure. Changes in construction delivery methods such as Construction Manager/General Contractor or Design-Build instead of Design-Bid-Build is one strategy for improving construction timelines. Other factors such as planning, programming, property acquisition, and environmental compliance will still make the process time intensive. Also, numerous projects which have been vetted for importance are already in the Future Years Defense Plan (FYDP), and cancellation of these projects might draw Congressional challenges.

Instead of focusing on faster execution of complex infrastructure processes, the Army might consider strategies which impact the qualitative aspects of the infrastructure portfolio as ways to offer better long range value to the Army. Improvements in quality may act as a hedge against changes when strategic vision morphs, and help mitigate the amplitude of cyclical infrastructure reductions and enlargements over time. Some concepts which merit discussion for the Army include land ownership methods, cultural values, conceptualizing tools, and design innovation. These concepts might provide options for more nimble infrastructure management to scale holdings up or down as changing strategies dictate, while improving the overall quality of the infrastructure portfolio in the form of reduced operations and maintenance costs, improved quality of life, and stronger nationwide defense posture.

#### Land Ownership

COL Todd Buchs provided an excellent overview of the public-private partnership at Brooks AFB, San Antonio, TX, in his paper “City-Base Initiative: A Means to 21<sup>st</sup> Century Installation Readiness.” In 1999, the Air Force Material Command decided to examine strategies for cutting capital costs instead of the common practice of reducing operating costs. The city-base concept enabled DoD “to sell land or even whole bases to the public or private sector, and lease back only that portion that DoD needs, thereby permitting local economic development on the remainder of the base.” This allowed DoD to act “as a tenant versus a landlord.”<sup>38</sup> This concept removes or lessens the role of DoD in the expensive position of maintaining infrastructure such as utilities, roads, gates, street lighting, parking lots, and open terrain. Buchs listed five advantages and three disadvantages of this concept.

First, this idea does not require BRAC in order to implement a public-private partnership. Special federal legislation was enacted for Brooks AFB, which began paving the way for subsequent use of this concept.<sup>39</sup> Secondly, the cost savings by assuming a tenant role, to include infrastructure as well as services such as law enforcement, fire protection, and emergency medical services, can be tremendous.<sup>40</sup> Third, a profit-sharing arrangement can be established as part of the agreement to allow DoD to share in the revenues generated by development in the area.<sup>41</sup> Fourth, DoD can remain in control of the neighborhood by retaining veto authority on planning and activities in the area.<sup>42</sup> Lastly, quality of life and service related amenities could be extended by DoD or included in the agreement to the benefit of DoD personnel.<sup>43</sup>

Disadvantages of the City-Base concept included the difficulty in enacting this concept at a large, power projection platform.<sup>44</sup> Army posts in this category, such as Fort Hood, Texas, have a large footprint in acreage and personnel, and would not work well for this idea. Secondly, increased DoD force protection requirements make this challenging given the layout of the infrastructure being considered.<sup>45</sup> Lastly, City-Base requires “long term leases be authorized to permit the developer to amortize his costs over a range of 25 to 50 years and beyond.”<sup>46</sup> Brooks AFB violated this last recommendation as DoD made the decision to place the post on the BRAC 2005 closure list less than three years after the Air Force signed over the land, facilities and utilities to the Brooks Development Authority on 22 JUL 2002.<sup>47</sup>

The City-Base initiative appears to be a viable tool for future consideration in instances where a small Army footprint is located near an urban area or land with underlying potential for development, and a public or private sector authority is willing to

undertake the long term development potential. Exit clauses will need to be established to mitigate developer risk for instances, like Brooke AFB, where the DoD decides to place a City-Base location on the BRAC list after signing a long term lease with a development agency. This strategy might also have applicability for a national 'infrastructure surge' concept, where (and when) the Army cedes underutilized infrastructure to a development authority, but maintains access via lease considerations in the event of a large-scale national emergency.

### Cultural Values

The concept of identity has tremendous potential to affect defense infrastructure footprint in the future. The Armed Services have various cultures, although they generally approach installations in the same manner. Administrative areas for units, housing for soldiers and families, services such as medical clinics, chapels, schools, and daycare centers, and a suite of amenities ranging from department stores, grocery stores and restaurants, to MWR facilities, such as bowling alleys, swimming pools, and golf courses. This all-inclusive, full-service mindset is meant to promote quality of life standards for military members. Even at foreign locations or within combat zones, the Army has striven to provide a wide suite of amenities to address overall quality of life.

According to the 2008 Clement Study, FMWR personnel costs are broken into three categories: Category A, B, and C. Category A programs are considered absolutely essential in supporting the warfighting mission, and include Armed Forces Entertainment, Family Advocacy, Army Community Services, and gymnasiums.<sup>48</sup> Category B activities such as child care centers, youth services, and outdoor recreation satisfy basic physiological and psychological needs of soldiers and their families.<sup>49</sup> These activities have a limited ability to generate offsetting revenue. Category C

activities such as golf courses, bowling centers, and F&B outlets benefit morale and esprit-de-corps, and are expected to be financially self-sustaining.<sup>50</sup>

Challenges exist with this model. First, the cost of trying to operate garrisons with a full range of amenities is significant, and the Army may be carrying considerably more infrastructure than is truly vital to our nation's defense. While these installations provide jobs to local community members and a fair amount of economic activity, the integration of the post into the community is often limited due to physical separation of the post and increased force protection initiatives. In addition, local businesses may have difficulty competing with the services provided on military bases.

While the Services have slightly different cultures, the manifestation of Service identities in the form of base infrastructure is actually fairly consistent across the DoD. The identity each Service has of itself plays a vital role, and can be adjusted from a cultural standpoint to help define an organization over time, which in turn can dramatically change infrastructure requirements. For instance, do bases really require the extensive services provided today? Could a normal base be structured differently while still supporting employees, soldiers, and families? Could these services be approached in a different manner to provide better connectivity to local communities while meeting Army Family Covenant obligations?

The Reserve Component (RC) infrastructure model is largely representative of this situation as fewer amenities are provided within the RC infrastructure portfolio. The RC is comprised of the Army Reserve and the National Guard. From an infrastructure perspective, there is dissimilarity between the Army Reserve and National Guard. The Army Reserve as a federal organization houses units in approximately 1,000 Reserve

Centers which are located in communities throughout the country, then uses active component locations and facilities for other elements of its infrastructure.<sup>51</sup> The National Guard as a state and federal organization houses units in Readiness Centers which are located in communities throughout the country, typically on State owned property, yet also provides other elements of its infrastructure including state headquarters (Joint Forces HQs), maintenance facilities (Field Maintenance Sites), aviation facilities (Army Aviation Support Facilities), logistics facilities (United States Property and Fiscal Office), and certain training sites.

The large suite of amenities found on active duty installations are either non-existent within the RC, or exist in small quantities, typically at training sites. Despite the dearth of amenities, the National Guard, which has more personnel than the active duty Navy, Air Force, and Marine Corps, respectively, still maintains an all-volunteer force of approximately 360,000 soldiers.<sup>52</sup> This begs the question, why does the Army invest millions of dollars in infrastructure for amenities when the RC has proven the All-Volunteer Force can be maintained with less FMWR related infrastructure? Perhaps the active component could use elements of the RC model to reshape the Army's cultural identity through infrastructure and ultimately save significant money while strengthening the bond with the citizenry it serves.

### Conceptualizing Tools

The ability to thoroughly understand the operating environment remains a significant challenge for senior leaders. The volatile, uncertain, and complex world in which we live creates dynamic problem sets for decision makers. The formation of IMCOM and the centralization of infrastructure management in the Army fosters better unity of effort for the organization. The use of Data Visualization, Modeling, and Virtual



Enterprises may provide leaders a better understanding of short and long term impacts of certain decisions, and could result in a more resilient infrastructure posture.

The advent of the Information Age has enormously increased the amount of data circulating within organizations, as well as the way data is collected, interpreted and used for operational purposes. Data visualization is the field of study that has emerged in the last thirty years to address this proliferation of data. One definition states, “a cognitive process performed by humans in forming a mental image of a domain space....the visual representation of a domain space using graphics, images, animated sequences, and sound augmentation to present the data, structure, and dynamic behavior of large, complex data sets that represent systems, events, processes, objects, and concepts.”<sup>53</sup> A more concise definition is “the use of computer-supported, interactive visual representations of data to amplify cognition.”<sup>54</sup> The process involves gathering raw data, turning it into information, analyzing the information, and presenting the information in a cohesive and interconnected manner to create knowledge and aid decision makers.

The amount of data facing senior leaders in the military is daunting. The Secretary of the Army and the Chief of Staff make critical decisions on issues which run the Doctrine, Operations, Training, Maintenance, Intelligence, Logistics, Personnel, and Facilities (DOTMILPF) gauntlet. Senior leaders within ACSIM/IMCOM base numerous decisions regarding Base Operating Services (BOS), Sustainment, Restoration, and Modernization (SRM), and Military Construction (MILCON) on data culled from various sources around the globe. The need to understand these data sets through various lenses has significant impact not just on infrastructure decisions, but how the Army as a

whole makes long range decisions which might have tremendous impact on national security. Data visualization can be a useful tool to reinforce these cognitive leaps by analyzing complex sets of data and presenting them to leaders in ways to allow the gestalt to be recognized.

A short example of data analysis being used to convey understanding across a broad range of factors is included in the graphic, U.S. Army Divisions in World War II (WWII), and can be found at <http://www.historyshots.com/USArmy/>. This single graphic is able to broadly display a comparison of all divisions within the Army during their WWII service. A significant number of factors such as division insignia, date of unit formation, length of combat duty, commanders of the divisions, routes traveled in either southern Europe, northern Europe, or the Pacific, and active/reserve component divisions, all come together to visualize information in a concise format.

The Army could use data visualization to better understand defense posture in the 21<sup>st</sup> century. Visualizations which focus on the infrastructure footprint might clarify strengths and weaknesses in the Army model. Although the United States has enjoyed the luxury of enormous defense budgets in recent history, danger lies in complacency and failure to assess opportunities and weaknesses which a thinly financed competitor may be exploiting out of resource necessity.<sup>55</sup> As future defense budgets constrict in the United States, data visualization could assist in the examination of ideas such as: the relationship between infrastructure and the all-volunteer force, the posture of military sites in relation to transportation nodes to assess effective power projection, or the impact of cyberspace and emerging technologies on conventional forces.

Another potential target for providing conceptual support to strategic leaders involves the Modeling, Simulation and Gaming (MS&G) community. The DoD has invested heavily in MS&G capabilities as a means to train the force while preserving resources. MS&G is used to support decision making in the functional communities: operations, training, acquisition, research and analysis, testing, and experimentation. According to the Modeling and Simulation Information Analysis Center, a subsidiary of the Defense Technical Information Center, the military acquisition community uses M,S&G: (1) to evaluate requirements for new systems and equipment; (2) to conduct research, development and analysis activities; (3) to develop digitized prototypes and avoid the building of costly full scale mockups; and (4) to plan for efficient production and sustainment of the new systems and equipment when employed in the field.<sup>56</sup> This begs the question if M,S&G is used to support decision making for these functions within the organization, why has it not been used to assist decision making for infrastructure? Certainly the technology is available for this type of simulation and the billions of dollars spent annually on the built environment by the DoD warrants infrastructure wargaming to enhance decision making processes.

The software game, SimCity and its sequels, SimCity 2000, SimCity 3000, and SimCity 4 (see figure 1), have been among the top selling video games in history.<sup>57</sup> These games provide the ability to build complex urban environments while managing resources. This type of simulation could be used to evaluate Army global infrastructure footprint and provide gaming situations to evaluate future courses of action.



Figure 1. Example of SimCity 4

The obvious advantage MS&G provides to senior leaders is the ability to test various infrastructure scenarios for efficiency and effectiveness. The Army's global footprint could be reviewed and case studies created to link warfighting at various scales and within different COCOM's to determine preferred locations of domestic and foreign basing strategies. The quality and scope of a 'national surge strategy' could be examined to determine the ability to quickly and efficiently support troop various levels during national mobilizations. Most importantly, the Army would create empirical data which could be utilized to bring infrastructure in line with strategic vision.

Another aspect of technology which can influence infrastructure decisions is Virtual Enterprises. Professors Wigand, Picot, and Reichwald examine changing organizational structures, evolving forms of management, and dissolution of corporate boundaries as the Information Age continues to evolve.<sup>58</sup> They describe the concept as:

Virtual enterprises develop through a network of physically dispersed organization units, participating in a coordinated division of labor-based value-added process.... Virtual organizations are considered a counterbalance to organizational forms with long-term internal and external boundaries, a fixed location, and relatively permanent resources. Such an enterprise is able to improve its performance through the dissolution of classical time and space limits and structures beyond the point possible through its traditionally available resources.<sup>59</sup>

A better understanding of these factors could result in greater use of Virtual Enterprises by the Army.

Three characteristics of Virtual Enterprises are Modularity, Heterogeneity, and Time and Spatial Distribution. Modularity relates to “relatively small but manageable units with decentralized decision-making competence and responsibilities.”<sup>60</sup>

Heterogeneity considers that basic components have difference performance profiles in order to create symbiotic relationships while avoiding redundancy and inefficiency.<sup>61</sup>

Lastly, Time and Spatial Distribution discusses the relationship of elements in time and space and limitations of information and communication infrastructure on the system.<sup>62</sup>

The Army has begun to incorporate certain elements of the virtual workplace, mainly in the form of flattening the organization through modularization and decentralization of decision making, as well as use of email, video conferencing (VTC's) and distance-learning classrooms.

The Army should evaluate the potential of Virtual Enterprises for its enterprise infrastructure. The Oregon Army National Guard has increased reliance on technology to identify facility maintenance issues in order to provide coverage over vast geographic areas with fewer staff members.<sup>63</sup> In addition, they have centralized control of HVAC systems from across the state to provide energy management and energy data collection with a single Energy Manager at the state Joint Forces Headquarters.<sup>64</sup>

Spatial proximity is a decisive characteristic of “same time/same place” organizations,<sup>65</sup> but the Army may find elements within their organization, especially administrative or staff functions, not necessarily tied to spatial proximity which could be more cost effective to approach in the virtual sense.

## Planning, Zoning, and Design Opportunities

An additional area to consider lies in the planning and design fields, and the potential to transform Army bases into more integrated, humane, and progressive places in which to live and work. Progress in this area may have a positive result for the Army's image and efforts to retain talented personnel in the All-Volunteer Force. The current layout of large Army garrisons, such as Fort Bragg, follows a suburban model (most likely the result of historically having large tracts of land available for development). The surplus of land, over time, coupled with relatively low population densities has fostered a planning methodology that encourages Army posts to sprawl buildings over wide areas and create posts which are vehicle-centric.

Zoning tends to reinforce this planning model by creating separation of uses, such as housing in one area, administrative space in another, and separate amenities and services throughout the garrison environment. Army bases seldom have a true core or main street sector, and rarely have integration of uses in an urban sense. This combination of vehicular-centric planning with separation-of-use zoning increases infrastructure costs due to the requirement of additional road networks and longer utility runs. In addition, military posts tend to have relatively slow driving speeds for safety reasons, which could increase resident and employee frustration given the type of planning and zoning models utilized.

The Army should drive new master planning efforts to seek better integration of services in order to create bases which allow a wider variety of living and working arrangements. Ideas such as commercial cores with housing opportunities, neighborhoods integrated with services, amenities such as golf courses lined with family housing throughout the course (see figure 2). These efforts would largely be undertaken

at core Army installations which are likely to withstand future BRAC rounds in order to justify long term investment decisions. The Army might combine planning, zoning, and land ownership ideas in the form of commercial enterprise zones to spur community partnerships. By locating these zones at the edge of post, collaborating with private developers for financing, and shifting them outside of force protection barriers, the Army could reduce investment in non-vital infrastructure such as department stores, grocery stores, and movie theaters, while still providing quality of life amenities to military members.

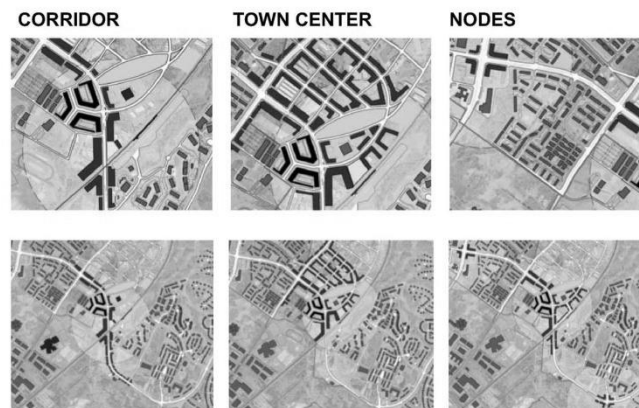


Figure 2. City planning concepts

The Army is improving master planning efforts by two means. First, the inclusion of six hours of planning training during the four week Pre-Command Course for new Active Component garrison commanders.<sup>66</sup> This training encompasses planning principles, roles and responsibilities, planning considerations, staff professional development, and review of current master planning efforts.<sup>67</sup> Second, the Army Corps of Engineers (USACE) emphasizes improved planning for program managers through a set of training courses which include Real Property Master Planning, Advanced Master Planning and Master Planning Visualization Techniques.<sup>68</sup> The planning community

within Army circles is growing, and the addition of the Army Master Planning Portal on Army Knowledge Online (AKO) as well as numerous articles in professional journals, has fostered a strong planning dialogue within the Army.<sup>69</sup> USACE estimated approximately \$10M in planning support worldwide in 2008.<sup>70</sup> Continuing this trend through senior leader emphasis and placing these ideas into practice should provide significant benefit to the Army.

Architecture is another area which could qualitatively enhance Army infrastructure and serve as a recruiting and retention tool. Recognition of the Army as a progressive organization should be sought through engagement with the architectural community to design award winning and innovative housing and administrative spaces. The organization could be a cultural leader given the sizable infrastructure budget it possesses, which might foster better civil-military relationships and enhance communities in which the Army is located.

The Oregon National Guard (ORNG) has aggressively pursued high design ideals and Leadership in Energy Efficient Design (LEED) projects. They have relied heavily on the Design-Build delivery system coupled with design centric requirements to raise standards in the quality of the built environment. The strategy has been beneficial as agencies which were once reluctant supporters of the military, such as academia, are now seeking partnerships with the ORNG. The recent partnership with Treasure Valley Community College in Ontario, Oregon, produced a LEED Gold Readiness Center on the college campus, complete with a 105KW solar array to supply the building with energy and the college with an alternative energy training laboratory.<sup>71</sup> Another example includes the current collaboration with Columbia Gorge Community



College in The Dalles, Oregon, which should produce a LEED Gold facility and a stunning addition to the college landscape.<sup>72</sup> (see figure 3) These efforts are seen as meaningful to the communities they serve, vital to the soldiers they serve, and strong recruiting tools for the Army.



Figure 3. Progressive Design, The Dalles Readiness Center, ORNG

### Summary

Large organizations constantly face the dilemma between investing enough in infrastructure to remain viable yet maintaining the ability to reduce or change requirements when markets fluctuate or new opportunities arise. Leadership in large organizations must anticipate future requirements to ensure ponderous infrastructure processes are aligned with changes in strategic vision. This remains true for private and public sector organizations. Perhaps even more so for public sector organizations, as the time required to plan, program, acquire property, seek funds, and execute can be as long for new construction as it is for disposal of economically obsolete properties. The challenge, therefore, is how to execute changes to infrastructure when strategic vision will likely change several times during the lifespan of the average federal building.

The first step is to understand how the Army makes infrastructure decisions and examine all tools which might improve linkage between infrastructure and strategic vision. Strategic documents promulgated the last seven years appear sound, and they discuss broad themes which remain relevant whether growing or shrinking the overall real estate portfolio. Once the strategic vision is distributed and implemented, the need

exists for effective command and control as well as a process to effect subsequent changes to the strategic vision. The Army maintains viable command and control via ASA (I,E&E) and OASD, and the shift from a decentralized to a centralized installations management command structure (IMCOM) starting in 2003 was a significant step toward unity of effort. The use of the BRAC process has been an effective tool for fostering large infrastructure changes, cost notwithstanding, but Congress appears reluctant to consider future BRAC rounds given their inability to control local outcomes.<sup>72</sup>

The Army, therefore, needs to make continued refinements to the BRAC process, yet be prepared with other strategies for improving its infrastructure posture. The idea of exploring ownership strategies for specific sites, such as moving from property owner to a lessee position and passing infrastructure costs to developers, may have merit. Another factor relates to Service cultural values and use of Reserve Component strategies for reducing or rethinking full-service garrisons and the costs they entail. Furthermore, the use of data visualization and computer modeling techniques to improve strategic decisions may provide senior leaders with a different understanding of the Army's global infrastructure posture and ways it could be altered to better suit changing international considerations. Additional technology driven solutions relate to the concept of Virtual Enterprises and the dissolution or rearrangement of certain organizational roles as the Information Age continues to mature.

Finally, the enhancement of the Army's built environment through planning and design emphasis suggests potential to transform Army bases into more integrated, humane, and progressive places in which to live and work. The pursuit of qualitative

goals may help position the organization to attract and retain the nation's best talent for the All-Volunteer Force. Ultimately, the ability to reduce infrastructure costs to a minimum while ensuring America retains the world's most capable military force remains an enduring challenge for Army leadership.

## End Notes

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